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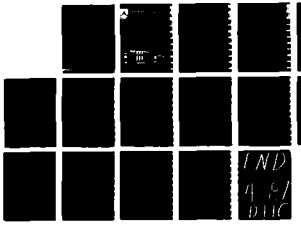

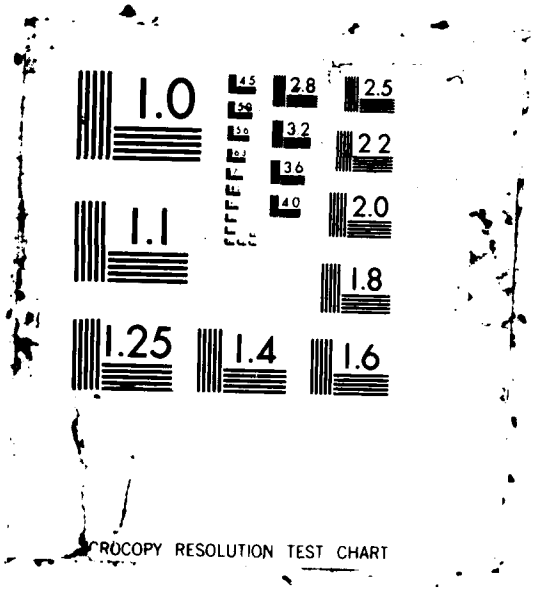
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AD-A178 292

AIR WAR COLLEGE

RESEARCH REPORT

No. AU-AWC-86-090

AUTOMATING BASE FUELS ACCOUNTING

By LT COL VICTOR E. HARDIN

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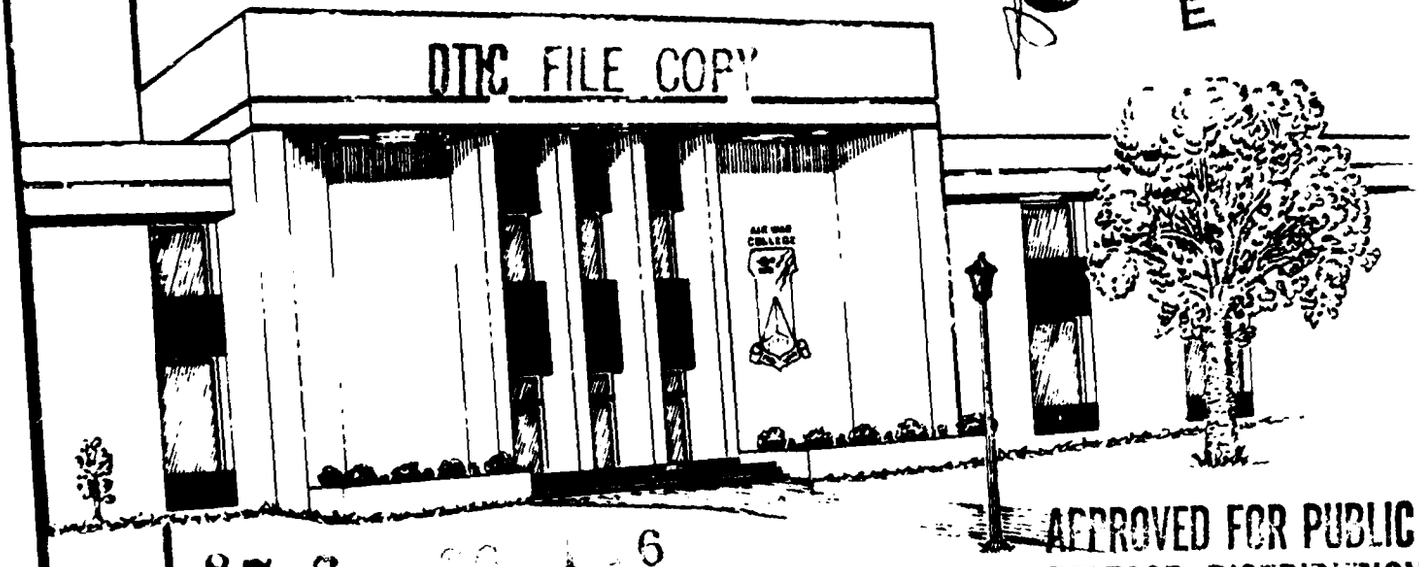

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AUTOMATING BASE FUELS ACCOUNTING

by

Victor E. Hardin
Lieutenant Colonel, USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE RESEARCH

REQUIREMENT

Research Advisor: Colonel Allen Dodson

MAXWELL AIR FORCE BASE, ALABAMA

MARCH 1986

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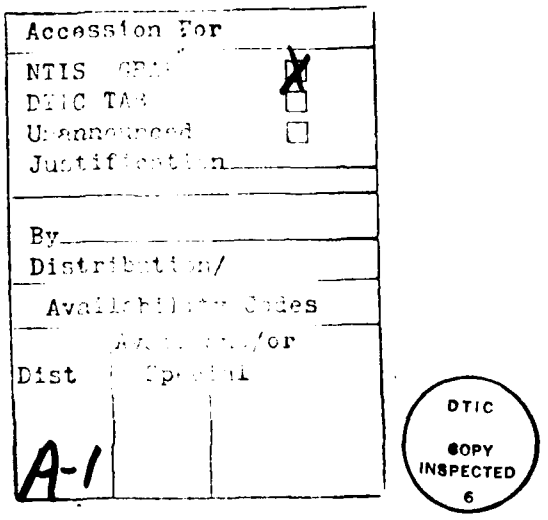

AIR WAR COLLEGE RESEARCH REPORT ABSTRACT

TITLE: Automating Base Fuels Accounting

AUTHOR: Victor E. Hardin, Lieutenant Colonel, USAF

Recommends a reduction in the labor intensiveness of the base fuels accounting system as a means to decrease operating cost and increase capability. Author reviews the present accounting system, then proposes a personal computer be used to reduce personnel requirements and increase responsiveness of the fuels management system.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Victor E. Hardin (M.B.A., Inter-American University) has held a number of diverse fuels related jobs during the past eighteen years. Positions have ranged from a Base Fuels Management Officer to the Joint Petroleum Officer for LANTCOM, a Unified Command. He has spent extensive time overseas with assignments in Vietnam, Puerto Rico, Thailand, and Japan. Awards he has received include the Bronze Star, Defense Meritorious Service Medal, Air Force Meritorious Service Medal (1 OLC), and AF Commendation Medal (3 OLC). He is a graduate of Armed Forces Staff College, class of 82, and Air War College, class of 86.

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CHAPTER I

AUTOMATING BASE FUELS ACCOUNTING

INTRODUCTION

Background

In my opinion, one of the most notable innovations to occur in information handling during the last decade is the development of the personal computer--PC. The PC has made it possible for managers to receive, analyze, store, reformat, transfer, and output vast quantities of information. It has remarkable ability to handle accounting data independently or process raw data and transmit a semi-finished product to another compatible system for further processing. The speed and accuracy with which the PC accomplishes these functions warrant its introduction into USAF Fuels Management Branches.

Each Air Force Base with a significant flying mission has a Fuels Branch assigned. This branch ensures "quality petroleum products (jet fuel). . . are issued safely and efficiently to using organizations (aircraft)." (14:7) The accounting function of the Fuels Branch is charged with the documentation of all fuels transactions. . . . (14:29) The forms and techniques used to accomplish this have not significantly changed, in substance or function, over the

last eighteen years. A minor improvement has been the elimination of computer input cards (IBM cards) and a transition to an input data terminal. Otherwise, basic fuels accounting methodology remains unchanged. Using manual accounting--forms and adding machines--the daily inventory status is posted to a summary form, AF Form 1237. The raw data is again segregated and transmitted via remote input terminal to the "supply" computer which starts the billing/reorder process.

This manpower intensive accounting system and the personal computer with its information handling capability would appear to be a perfect marriage. The PC effortlessly and paperlessly handling the base fuels accounting then transmitting the "raw" data to the "supply" computer for supply unique processing. This marriage has not occurred!

Need

On 12 Dec 85, President Reagan signed the Gramm-Rudman-Hollings bill into law. (4:2604) Very briefly summarized, this bill will attempt to eliminate the Federal Budget deficit by 1991. It "requires across-the-board cuts of nonexempt programs by a uniform percentage to achieve deficit targets if regular budget and appropriations actions fail to reach deficit goals" (4:2604) (defense is not

exempt). Without action by Congress, some officials project the fiscal 87 spending authority for defense will be reduced to the fiscal 84 level. (8:12)

At the 24-25 October 1985 Air Force Association (AFA) convention USAF Under Secretary Aldridge remarked, "We (USAF) will have to find ways to do the job with fewer people." (10:86) Career USAF personnel have heard Under Secretary Aldridge's theme several times during our careers. For most of my eighteen years in the Air Force, we (USAF) have been "running out of money," only to "miraculously" survive to the next fiscal year.

In view of the Gramm-Rudman bill, it appears the cry "the wolves are coming" is finally coming true. The cuts envisioned under this bill will require every manager to face the Under Secretary's admonition and look at ways we can accomplish the mission with fewer people.

Addressing the personnel issue from another vantage point--a Pentagon official recommended a reduction in the number of support people required in a combat theater. (2:15) Although this official was not calling for an overall reduction in Air Force manning, his thesis coupled with the admonition of Under Secretary Aldridge and the cuts envisioned under the Gramm-Rudman bill lends credence to my thought that perhaps the wedding of a personal computer--with its information and accounting han(ing ability--and

the base fuels accounting process--with its manpower intensive paper handling process--is long overdue.

Purpose

This paper will look at the manual fuel accounting process, the innovation a PC could bring to the process and what benefits might be achieved for a Fuels Management Branch and the Air Force. Due to the length of discussion, I will not address networking system(s), detail software requirement(s), interface resolution(s), or any of the associated more technical issues. This paper's thrust is to offer a direction and provide a concept, suitable for further examination, that will minimize any budget cuts, but more importantly will propel the Fuels Branch into the "information handling/automation world," and increase flexibility and capability.

CHAPTER II

ACCOUNTING AND DOCUMENTATION

To better understand the significance of this PC and fuel accounting "marriage proposal", it may be beneficial to review the base Fuels Management Branch accounting and documentation process. This review is purposely abbreviated for simplicity. Certainly there are various options of these procedures; however, as a "vanilla" presentation the salient points are adequately addressed.

Accounting Forms

AF Form 1231 (Record of Receipts). The storage specialist enters on this form all fuel received from outside sources (i.e., contract deliveries). Entries include base, product, date, storage tank which received the fuel, company, contract, and truck identification. (15:71)

AF Form 1232 (Bulk Fuels Issue/Defuel Summary). This form is a refueling unit checkbook. It summarizes fuel issues by maintaining a history of beginning and ending meter reading. The individual issues--checks--are documented on AF Form 199X, which become a part of the AF Form 1232, and their sum should equal the difference between the two meter readings. (15:121)

AF Form 1233 (Bulk Storage Summary). Used to summarize 24 hours of storage activity, excluding receipts (i.e., issues, transfers, defuels, shipments). (15:120)

AF Form 1234 (Fueling Unit Inventory). Each day the fuels accountant posts the rated capacity of the refueling trucks available to issue fuel to aircraft on this form, for record maintenance, and on the AF Form 1235 to be included as a component of the physical inventory. (15:122)

AF Form 1235 (Physical Inventory). After gaging the storage tanks, the fuels specialist enters the readings--feet and inches of fuel and water in the tank--on this form. The readings are converted to gallons contained in the tank by use of gage charts. (These charts are "unique" for each tank and convert each one-eighth inch increment of fuel and water to a corresponding gallonage.) (15:122) Depending upon the Fuels Branch, this process of converting stick reading to gallonage may be done two or more times to ensure accuracy.

AF Form 1237 (Inventory). This is the summary document of all fueling activity of the previous 24 hours, 72 hours for the weekend. Entries for this form are posted each duty day and are calculated or come directly from the above forms (15:123)

AF Form 199X. The AF Form 1994s/5s are used to record and document fuel issues to DOD and non-DOD customers

respectively. After the refueling, this form is completed by the fuels specialist. It includes the following entries: (15:93)

a. Type Fueling (Refuel/Defuel)

b. Type Fuel (JP4/Avgas/JP8)

c. Fueling Unit Identification

d. Aircraft Identification

e. Gallons Handled (Refueled/Defueled)

f. Date

g. Signatures

h. Document Number

You are correct when you think this is very much like the neighborhood gas station slip you sign after using a credit card.

Accounting Procedures

Each morning the fuels accountant receives the AF Form 1235, verifies the gage readings conversion, enters the pipeline and refueling unit inventory, and manually totals these three components to obtain a physical inventory which is then posted to the AF Form 1235 and 1237. Next, the AF Form 1232s are processed, insuring the AF Form 199Xs have been correctly completed. The issues documented on the AF Form 199Xs are totaled on an adding machine to determine the amount of fuel issued via hydrants and trucks. These

results are also posted on the AF Form 1237. Then AF Form 1233 issues from storage are checked and posted to the AF Form 1237. Receipts entered on the AF Form 1231 are manually added and posted to the AF Form 1237. The current day's book--projected inventory--is then determined by adding receipts to the previous day's physical inventory and subtracting total issues. The difference between the projected and current day's physical inventory is the day's gain or loss. (This discussion did not address the "lesser" issue of refueling unit, intransit or determinable losses.) (15:123)

Computer Inputs

The information on the individual AF Forms 199Xs, and 1231s and physical inventory from the AF Form 1235 are keyed into the "supply" computer via an input terminal located in the Fuels Management Branch accounting section. In addition to developing summary listings and reports of the previous days' fuels activity, the "supply" computer begins the billing and requisition process.

Fuel Service Documentation

Fuel support request are entered on the AF Form 824 (Daily Fuels Request and Servicing Log) by the senior controller assigned to the Fuels Control Center (FCC). The

form is used to monitor on-going refuelings and serves as a historical record of fueling activity. Entries include base, date and senior controller ,management data consists of work order number, time of request, organization requesting service, aircraft MDS/tail number/location, fueling unit identification, time log (dispatched, arrived/departed, started/stopped fueling), gallons issued, and fueling/ maintenance specialist. At the start of each day a new form is initiated and the old form filed. (14:54)

Report Preparation

In addition to the daily processing of the various accounting forms, the fuels accountant must also submit periodic inventory related reports. Three reports, the Peacetime Operating Stock (POS) Computations, Bulk Fuel Storage Computation, and Inventory Variances and Tolerances, are typical of the manual effort required. These reports are based on culmulative issue, storage, receipt, and associated derivative data. (15:49, 51, 130) To complete the reports, however, the accountant researches other supporting forms (e.g., AF Form 1237s, 1235s, 1234s) extracts information from them and other standard fuel data sources, post it to the applicable report, manually calculates other derivative data, and enters it on the report before submitting it. (15:49, 51, 130)

Information Redundancy

Figure 1 shows little data in the Fuels Branch is limited to a single form. Rather than being unusual, it is common for the same information to be entered by different fuels specialist on different forms. Selected data from these various forms are manually manipulated and posted to another form in order to submit a report or complete a supporting document. In the case of the "supply" computer, data is manually input in its original "raw" form in order for the computer to initiate unique supply processing and produce duplicate listings of the manual summary.

CHAPTER III

PROPOSAL

Placing a personal computer in the Fuels Management Branch would allow information to be entered into the system once then "moved" and manipulated as needed to fulfill other requirements. As an information management system, the computer has long been recognized as far superior to and faster than manual efforts. Over the last decade computer data crunching speed has increased 18-fold. (7:110) The volume and manipulations of data in the Fuels Branch certainly supports an investment in a personal computer.

Documentation Changes

Placing the computer in the FCC is the most logical location and would make the FCC more functional both for control and management. I recognize this would entail some changes in the accounting and documentation procedures; however, as reported in an October 85 issue of Business Week, a number of companies were able to achieve significant advances via automating their information handling system. (7:108) I believe the same level of advancement would be available for the Fuels Branch.

The most pronounced change would be elimination of the various paper accounting forms, AF Form 1232s, 1233s,

1234s, and the rest. The data that was posted on these forms for the fuels accountant to total and post to the summary form (AF Form 1237) would be phoned or radioed directly to the FCC for input into the PC.

Briefly summarized, documentation would follow this procedure: after gaging the storage tanks, the fuels specialist would call the readings into the FCC for computer entry. The computer would mathematically determine the storage inventory, add the pipeline inventory maintained in memory--and actual truck inventory--capacity minus issues. This sum, the physical inventory, would be instantly available. Temperature or handling gains or losses could be immediately determined.

As fuel requests are received, the PC would determine request time and assign work order number. The FCC controller would enter identification data (see Figure 1), a program edit would verify if the (a) aircraft was base assigned and accounting data was on record; (b) fueling unit had the correct fuel for aircraft MDS; and (c) fuels specialist had been certified on that type of fueling unit. If the aircraft was transient or non-DOD, the computer would advise accounting data required. After completing the fueling, the fuels specialist would radio the FCC time log data, meter readings and quantity of fuel issued. The meter

readings file would provide a security check to insure all issues were documented.

After filling a refueling truck, the storage fuels specialist phones into the FCC the storage tank number used to fill the truck along with the issuing fillstand meter readings. Another edit program compares truck issues and fillstand meter readings to determine truck gains or losses.

Locations which receive a number of tank truck deliveries from multicontract sources, could record the receipt data--tank, truck, temperatures--on the AF Form 1231 and forward it to the FCC for delayed input. Generally, however, it would be much better to call in individual receipts to maintain a real-time account of inventories.

The information manually entered on the AF Form 1237 under the present system becomes dynamic with the PC and is continuously updated after each transaction (i.e., after each aircraft servicing the truck and physical inventory and net issue data would update automatically). Management would always be able to instantaneously determine the status of the account--what servicing are in progress or scheduled, fuel receipts, losses or gains throughout the system.

Report/Computer Input Changes

The requirement to flow the data to the "supply" computer would be met by sending the PC data file by modem

or physical transfer of the disc. Information required for POS Computation (AF Form 761), Bulk Fuels Storage Computation (AF Form 759) and Fueling Variances and Tolerances could be periodically extracted from the disc and reformatted for report submissions. An even better approach may be to make these data bases dynamic and update them after each transaction or end of day. Having the Variances and Tolerances' base line loaded would offer management an opportunity to continuously examine its performance against these standards.

CHAPTER IV

BENEFITS

As reported in the October 1985 issue of Personal Computing, the General Service Administration (GSA) Office of Budget has, over the past two years, automated its information management system. Responsible for monitoring an operating budget in excess of $5 billion and interfacing with the President's budget, means this automation achievement should not be taken likely. The Office of Budget's previous information management system compiled budget requirements with as many as 60, 23 column spreadsheets and multicolored pencils. This system evolved to a "dumb" computer terminal, at the Office of Budget, inputting to the mainframe computer at the Office of Management and Budget (OMB). This arrangement was also unsatisfactory for a host of reasons, no real-time ability to correct errors, listings were not available at the input location, inputs were not edited so mistakes were perpetuated. Then what did they (GSA Office of Budget) use to automate their information system? Simple, two PCs--IBM PC/XTs. (5:17)

No Fuels Branch comes even close to dealing with the volume of data required by this GSA office. There are similarities, however, 23 column spreadsheets sound vaguely familiar to AF Forms 824, 1237, 1235, and the host of other

forms fuels uses. The "dumb" terminal input system is a mirror of the present fuels accounting procedures. The inputting of data by the "accountant" on a dumb computer terminal at the Office of Budget to the OMB mainframe computer sounds very familiar also (it is a similar computer interface between fuels and the Phase IV base computer).

The happy ending to this is the PCs at GSA have reduced the error rates via program edits and reusing original raw data rather than requiring additional entries. Since the PCs have the raw data in memory they only reformat it for the various reports--notably "untouched by human hands." (5:17) The other benefit is increased visibility and modeling--what if?--capability without additional data inputs. This story is not unique; the 14 Oct 85 issue of Business Week reported companies as well known as USAA, American Airlines, McKesson, Merrill Lynch, American Hospital Supply, have also used information automation systems to increase their capability, flexibility and market shares. (7:108)

Then what specific and immediate benefits can the Fuels Branch, and in turn USAF, expect to derive from using a PC to account for fuels transaction? There are several, the most immediate include fewer personnel required to accomplish a task, real-time accounting, reduction in paperwork, and improved management visibility. Other follow-on

benefits include report preparation from the same data base in a "hands off" mode, quality control trend analysis capability, and a host of other record keeping functions such as truck inspection or differential pressure readings. We can examine some of the immediate benefits more closely.

Personnel Reduction

There are over one hundred Fuels Management Branches in the Air Force. (1:3-16) Each is authorized at least one fuels specialist as an accountant and most have two or more. (18) Fighter squadron deployments may include as many as three fuel accountants in the fuel support element. (14:41) The present fuel accounting techniques require personnel specifically dedicated to this task; however, by using a personal computer the accounting complexity and manpower intensity is reduced and this function could be shifted to the FCC. The resulting "surplus" accountant(s), as much as 5 percent of total fuels personnel at a deployed location, could be assigned to a "shortage" position in the Fuels Branch. (14:41) In the case of the deployed squadron this change could reduce support people in the combat theater or increase personnel available for direct aircraft support with no associated increase in manning.

In either case the USAF will benefit and accomplish more with the same number of total people. Under a budget

cutting scenario, via use of a PC, the Fuels Branch will accomplish the same job quicker, better and with increased flexibility while using less people. The personal computer becomes a "capability multiplier."

Real-Time Accounting

Using the present system it would be impossible to ascertain at 0400 hours Monday morning how much fuel had been issued from any storage system or truck. This is because storage tanks are not required to be gaged over the weekend. Friday and weekend transactions are processed on Monday morning, therefore, the latest inventory status would be as of Friday morning. The result is an inventory position that is at least 72 hours old. During the week the delay is "only" 24 hours since the paperwork is processed the next duty day. Knowledge of excessive losses or gains is subject to this time delay also. This is attributable to the requirement to process all the day's transactions before an adverse event can be detected.

By using a personal computer to account for each transaction these time delays "fade" away. For example, physical inventories would be as accurate as the last fueling event. Fuel handling losses or gains would be immediately detectable and corrective action could be instantly applied to prevent the abberration from becoming excessive.

Paperwork Reduction

Using the present system, eight separate forms are completed by as many as seven different individuals before the inventory position can be determined. Each piece of paperwork, most with redundant information, makes an input to the total equation of determining the inventory status. However, inputting all of the same data into an information management system eliminates the necessity of paper forms, adding machines and the propensity for error during manual transfer between forms. Once the data is entered into the data base the variation of its use and manipulations is infinite, but much more accurate due to less human interaction.

Increased Visibility

The ability to provide instantaneous data on the significant events occurring throughout the branch is an unprecedented accounting and management capability for the fuels community. For the first time ever the fuels officer would be able to provide the commander a full range of capabilities in real-time.

The increased account visibility will afford the fuels officer an opportunity to influence events rather than react to "mistakes." As the data base is increased synergistic management results become achievable.

CHAPTER V

CONCLUSION

The first question to ask ourselves is, "If major corporations and government agencies can develop information systems to handle their many accounts, why can't we (Fuels Management)?" My answer to that is "nothing" other than inertia. Just as the Maxwell AFB Accounting and Finance Office replaced the manual review process for civilian time cards with a Sperry PC and optical reader and saved millions of dollars, I believe the fuels community could substantially enhance its capabilities while saving even more by marrying its accounting procedures to a PC. (3:3) As the USAF educates more of its members about computer systems, under program Bold Stroke, more computer literate fuels specialist and managers will be assigned to the branch and the opportunities for even greater innovations will be available. (11:8)

In this paper I have not called for any revolutionary changes in the way fuels business is presently conducted. No new advanced state of the art equipment is envisioned. The "vanilla" information system concept proposed here has been tested in the civilian world--it works. It offers the military an opportunity to "piggyback" on tested and proved technology at minimum cost.

I believe this conceptual proposal to be sound and will result in a decrease in the number of personnel required to account for fuel. The PC will greatly simplify the task so that it (accounting) could be combined with other FCC duties. Branch overhead could be decreased and more personnel returned to direct support. This would provide not only a hedge against any budget (personnel) cuts, but also supports Under Secretary Aldridge's theme of "doing the job with less people" and the Pentagon official's desire to reduce support people in combat theaters. (10:86; 2:15)

INFORMATION REDUNDANCY

Data Description	AF Form 824	AF Form 1231	AF Form 1232	AF Form 1233	AF Form 1234	AF Form 1235	AF Form 1237	AF Form 199X	REPORTS[1] AF Form 761*	AF Form 759*	Variance Tolerance*	Inputs to Supply Computer
INVENTORY												
- STORAGE						X	X*					
- PIPELINE						X	X		X	X		
- TRUCK					X	X*	X*			X		
- PHYSICAL						X*	X*				X*	X
- PROJECTED							X*					C
IDENTIFICATION												
- FUELING UNIT	X		X	X	X			X				X
- AIRCRAFT	X							X				X
- FUELS SPECIALIST	X		X					X				
- MAINTENANCE SPECIALIST	X							X				
- TYPE FUEL	X	X	X	X	X	X	X	X		X		X
- TYPE TRANSACTION	X		X					X				X
- TYPE ISSUE	X		X				X	X				X
- BASE	X	X				X		X	X	X		C
- STOCK ACCOUNT								X	X	X		X
ISSUES (QUANTITY)												
- REFUEL UNIT	X		X*				X*	X	X*		X*	X
- HYDRANT	X		X*				X*	X	X*		X*	X
- STORAGE			X	X			X*					
- FROM CONTRACTORS		X					X*					X
OTHER												
- DATE	X	X	X	X	X	X	X	X		X		X
- TIME	X	X										
- UNIT GAIN/LOSS							X*				X*	
- TEMP GAIN/LOSS							X*				X*	C
- FUELING UNITS ASSIGNED					X							
- HYDRANT UNITS ASSIGNED												

* Data is manipulated (added, divided, etc.) before it is posted to this form.
C - Calculated by the system.
1 - After data is researched, posted manual calculations are required.

FIGURE 1

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